

## Conversion Challenge

Write the correct abbreviation for each metric unit.

1) Kilogram Kg

4) Milliliter mL

7) Kilometer Km

2) Meter m

5) Millimeter mm

8) Centimeter cm

3) Gram g

6) Liter L

9) Milligram mg

Try these conversions, using the ladder method.

1) 2000 mg = 2 g

6) 5 L = 5000 mL

11) 16 cm = 160 mm

2) 104 km = 104,000 m

7) 198 g = 0.198 kg

12) 2500 m = 2.5 km

3) 480 cm = 4.8 m

8) 75 mL = 0.075 L

13) 65 g = 65,000 mg

4) 5.6 kg = 5600 g

9) 50 cm = 0.5 m

14) 6.3 cm = 63 mm

5) 8 mm = 0.8 cm

10) 5.6 m = 560 cm

15) 120 mg = 0.120 g

Compare using <, >, or =.

16) 63 cm < 6 m

17) 5 g > 508 mg

18) 1,500 mL = 1.5 L

19) 536 cm = 53.6 dm

20) 43 mg < 5 g

21) 3.6 m > 36 cm

## Scientific Notation

Name: \_\_\_\_\_ Date: \_\_\_\_\_



Convert each number from scientific notation to real.

(1)  $4.427 \times 10^{-1}$  0.4427

(6)  $1.883 \times 10^{-6}$  0.000001883

(2)  $9.952 \times 10^6$  9952000

(7)  $3.412 \times 10^2$  341.2

(3)  $3.858 \times 10^{-3}$  0.003858

(8)  $9.748 \times 10^3$  9748

(4)  $3.673 \times 10^4$  36730

(9)  $4.297 \times 10^{-4}$  0.0004297

(5)  $5.862 \times 10^{-5}$  0.00005862

(10)  $7.437 \times 10^2$  743.7



Convert each number from real to scientific notation.

(11) 0.002397  $2.397 \times 10^{-3}$

(16) 5,167  $5.167 \times 10^3$

(12) 93.29  $9.329 \times 10^1$

(17) 0.0005511  $5.511 \times 10^{-4}$

(13) 6,139  $6.139 \times 10^3$

(18) 0.009578  $9.578 \times 10^{-3}$

(14) 1.772  $1.772 \times 10^0$

(19) 0.00006144  $6.144 \times 10^{-5}$

(15) 73.12  $7.312 \times 10^1$

(20) 0.03592  $3.592 \times 10^{-2}$

Student Name: \_\_\_\_\_

Score: \_\_\_\_\_

**Adding and Subtracting Numbers in Scientific Notation***Example:*  $3 \times 10^4 + 2.5 \times 10^5$ 

$$\begin{aligned} 3 \times 10^4 + 2.5 \times 10^5 \\ = 0.3 \times 10^5 + 2.5 \times 10^5 \\ = (0.3 + 2.5) \times 10^5 \\ = 2.8 \times 10^5 \end{aligned}$$

Answer:  $2.8 \times 10^5$  $2.5 \times 10^4 - 1.5 \times 10^3$ 

$$\begin{aligned} 2.5 \times 10^4 - 0.15 \times 10^4 \\ (2.5 - 0.15) \times 10^4 = \\ 2.35 \times 10^4 \end{aligned}$$

Answer:  $2.35 \times 10^4$  $1.43 \times 10^2 + 7.105 \times 10^5$ 

$$\begin{aligned} 0.00143 \times 10^5 + 7.105 \times 10^5 \\ (0.00143 + 7.105) \times 10^5 = \\ 7.10643 \times 10^5 \end{aligned}$$

Answer:  $7.10643 \times 10^5$  $1.2 \times 10^2 - 6 \times 10^3$ 

$$\begin{aligned} 0.12 \times 10^3 - 6 \times 10^3 \\ (0.12 - 6) \times 10^3 = \\ -5.88 \times 10^3 \end{aligned}$$

Answer:  $-5.88 \times 10^3$  $7.1567 \times 10^3 + 5.5 \times 10^6$ 

$$\begin{aligned} (0.0071567 + 5.5) \times 10^6 = \\ 5.5071567 \times 10^6 \end{aligned}$$

Answer:  $5.5071567 \times 10^6$  $9.65 \times 10^7 - 8.1 \times 10^6$ 

$$\begin{aligned} (9.65 - 0.81) \times 10^7 = \\ 8.75 \times 10^7 \end{aligned}$$

Answer:  $8.75 \times 10^7$

Student Name: \_\_\_\_\_

Score: \_\_\_\_\_

### Multiplying Numbers in Scientific Notation

*Example:*  $(4.1 \times 10^2)(9.5 \times 10^3)$

$$\begin{aligned} &(4.1 \times 10^2)(9.5 \times 10^3) \\ &= (4.1 \times 9.5) \times (10^2 \times 10^3) \\ &= 38.95 \times 10^{2+3} \\ &= 38.95 \times 10^5 \\ &= 3.895 \times 10^6 \end{aligned}$$

Answer:  $3.895 \times 10^6$

$(6 \times 10^4)(8 \times 10^5)$

$$\begin{aligned} &(6 \times 10^4) \times (8 \times 10^5) \\ &(6 \times 8) \times (10^4 \times 10^5) \\ &48 \times 10^{4+5} \\ &48 \times 10^9 \\ &4.8 \times 10^{10} \end{aligned}$$

Answer:  $4.8 \times 10^{10}$

$(1.4 \times 10^3)(5.2 \times 10^4)$

$$\begin{aligned} &(1.4 \times 10^3) \times (5.2 \times 10^4) \\ &(1.4 \times 5.2) \times (10^3 \times 10^4) \\ &7.28 \times 10^{3+4} \\ &7.28 \times 10^7 \end{aligned}$$

Answer:  $7.28 \times 10^7$

$(8.102 \times 10^6)(1.3 \times 10^1)$

$$\begin{aligned} &(8.102 \times 10^6) \times (1.3 \times 10^1) \\ &(8.102 \times 1.3) \times (10^6 \times 10^1) \\ &10.5326 \times (10^{6+1}) \\ &10.5326 \times 10^7 \\ &1.05326 \times 10^8 \end{aligned}$$

Answer:  $1.05326 \times 10^8$

$(7.538 \times 10^0)(1.952 \times 10^7)$

$$\begin{aligned} &(7.538 \times 10^0) \times (1.952 \times 10^7) \\ &(7.538 \times 1.952) \times (10^0 \times 10^7) \\ &14.714176 \times (10^{0+7}) \\ &14.714176 \times 10^7 \\ &1.4714176 \times 10^8 \end{aligned}$$

Answer:  $1.4714176 \times 10^8$

$(5.21 \times 10^4)(9.5 \times 10^6)$

$$\begin{aligned} &(5.21 \times 10^4) \times (9.5 \times 10^6) \\ &(5.21 \times 9.5) \times (10^4 \times 10^6) \\ &49.495 \times (10^{4+6}) \\ &49.495 \times 10^{10} \\ &4.9495 \times 10^{11} \end{aligned}$$

Answer:  $4.9495 \times 10^{11}$

Student Name: \_\_\_\_\_

Score: \_\_\_\_\_

Dividing Numbers in Scientific Notation

*Example:*  $(6.27 \times 10^5) \div (1.9 \times 10^3)$

$$\begin{aligned}
 &(6.27 \times 10^5) \div (1.9 \times 10^3) \\
 &= (6.27 \div 1.9) \times (10^5 \div 10^3) \\
 &= 3.3 \times 10^{5-3} \\
 &= 3.3 \times 10^2
 \end{aligned}$$

Answer:  $3.3 \times 10^2$

$(5 \times 10^4) \div (2.5 \times 10^2)$

$$\begin{aligned}
 &(5 \div 2.5) \times (10^4 \div 10^2) \\
 &2 \times (10^{4-2}) \\
 &2 \times 10^2
 \end{aligned}$$

Answer:  $2 \times 10^2$

$(2.4 \times 10^7) \div (3.5 \times 10^9)$

$$\begin{aligned}
 &(2.4 \div 3.5) \times (10^7 \div 10^9) \\
 &\sim 0.69 \times (10^{7-9}) \\
 &0.69 \times 10^{-2} \\
 &6.9 \times 10^{-3}
 \end{aligned}$$

Answer:  $6.9 \times 10^{-3}$

$(7.43 \times 10^4) \div (2.1 \times 10^4)$

$$\begin{aligned}
 &(7.43 \div 2.1) \times (10^4 \div 10^4) \\
 &3.5 \times (10^{4-4}) \\
 &3.5 \times 10^0
 \end{aligned}$$

Answer:  $3.5 \times 10^0$

$(7.1 \times 10^4) \div (8.2 \times 10^{11})$

$$\begin{aligned}
 &(7.1 \div 8.2) \times (10^4 \div 10^{11}) \\
 &0.866 \times (10^{4-11}) \\
 &0.866 \times 10^{-7} \\
 &8.66 \times 10^{-8}
 \end{aligned}$$

Answer:  $8.66 \times 10^{-8}$

$(8.306 \times 10^{11}) \div (9.54 \times 10^8)$

$$\begin{aligned}
 &(8.306 \div 9.54) \times (10^{11} \div 10^8) \\
 &0.871 \times (10^{11-8}) \\
 &0.871 \times 10^3 \\
 &8.71 \times 10^2
 \end{aligned}$$

Answer:  $8.71 \times 10^2$

# U. S. - Metric Conversions

## Length

1 in = 2.54 cm  
 1 ft = 30.5 cm  
 1 yd = 91.4 cm  
 1 mi = 1610 m  
 1 mi = 1.61 km  
 0.0394 in = 1 mm  
 0.394 in = 1 cm  
 39.4 in = 1 m  
 3.28 ft = 1 m  
 1.09 yd = 1 m  
 0.621 mi = 1 km

## Weight

1 oz = 28.3 g  
 1 lb = 454 g  
 1 lb = 0.454 kg  
 0.0353 oz = 1 g  
 0.00220 lb = 1 g  
 2.20 lb = 1 kg

## Capacity

1 gal = 3.79 L  
 1 qt = 0.946 L  
 0.264 gal = 1 L  
 1.06 qt = 1 L

1. 2500 m = 2.5 km

$$2500m \left( \frac{1km}{1000m} \right) = 2.5km$$

2. 3.54 m = 354 cm

$$3.54m \left( \frac{100cm}{1m} \right) = 354cm$$

3. 1,234,560 cm = 12,345.60 km

$$1,234,560cm \left( \frac{1km}{100,000cm} \right) = 12,345.60km$$

4. 30,000 kg =  $3 \times 10^7$  g

$$30,000kg \left( \frac{1000g}{1kg} \right) = 3 \times 10^7g$$

5. 48 oz = 3 lb

$$48oz \left( \frac{1lb}{16oz} \right) = 3lb$$

6. 2.4 mi = 12672 ft

$$2.4mi \left( \frac{5280ft}{1mi} \right) = 12672ft$$

7. 420 hr = 2.5 wks

$$420hr \left( \frac{1day}{24hr} \right) \left( \frac{1wk}{7day} \right) = 2.5wk$$

8.  $\frac{3}{4}$  hr = 2700 sec

$$\frac{3hr}{4} \left( \frac{60min}{1hr} \right) \left( \frac{60s}{1min} \right) = 2700s$$

9.  $88 \frac{ft}{sec} = \frac{60}{hr} \frac{mi}{hr}$

$$88 \frac{ft}{sec} \left( \frac{1mi}{5280ft} \right) \left( \frac{60s}{1min} \right) \left( \frac{60min}{1hr} \right) = 60 \frac{mi}{hr}$$

10.  $45 \frac{mi}{hr} = \frac{66}{sec} \frac{ft}{sec}$

$$45 \frac{mi}{hr} \left( \frac{5280ft}{1mi} \right) \left( \frac{1hr}{60min} \right) \left( \frac{1min}{60sec} \right) = 66 \frac{ft}{sec}$$

13. 17.0 in = 43.18 cm

$$17.0in \left( \frac{2.54cm}{1in} \right) = 43.18cm$$

14. 1950 g = ~4.3 lb

$$1950g \left( \frac{1oz}{28.3g} \right) \left( \frac{1lb}{16oz} \right) = \sim 4.3lb$$

$$1950g \left( \frac{1lb}{454g} \right) = \sim 4.3lb$$

15.  $0.85 \text{ qt} = \approx 802 \text{ mL}$

$$0.85 \text{ qt} \left( \frac{1 \text{ L}}{1.06 \text{ qt}} \right) \left( \frac{1000 \text{ mL}}{1 \text{ L}} \right)$$

16.  $61 \text{ cm} = \approx 2 \text{ ft}$

$$61 \text{ cm} \left( \frac{1 \text{ m}}{100 \text{ cm}} \right) \left( \frac{3.28 \text{ ft}}{1 \text{ m}} \right) =$$

17.  $1.2 \text{ kg} = \frac{42.24}{\text{oz}}$

$$1.2 \text{ Kg} \left( \frac{2.2 \text{ lb}}{1 \text{ Kg}} \right) \left( \frac{16 \text{ oz}}{1 \text{ lb}} \right) =$$

18.  $2 \text{ L} = \frac{4.24}{\text{pt}}$

$$2 \text{ L} \left( \frac{1.06 \text{ qt}}{1 \text{ L}} \right) \left( \frac{2 \text{ pt}}{1 \text{ qt}} \right) = 4.24 \text{ pts}$$

19. The distance from a Port Huron to the Indiana State line is approximately 271 miles (via I-94). Express this distance in kilometers.

$$271 \text{ miles} \left( \frac{1.61 \text{ Km}}{1 \text{ mi}} \right) = 433.6 \text{ km}$$

20. A baby born in the US weighs 3.295 kg according to the scale in the birthing room. Convert this to pounds and ounces so you can tell the grandparents how much the baby weighed.

$$3.295 \text{ Kg} \left( \frac{2.2 \text{ lb}}{1 \text{ Kg}} \right) = 7.249 \text{ lbs}$$

$$0.249 \text{ lb} \left( \frac{16 \text{ oz}}{1 \text{ lb}} \right) = \approx 4 \text{ oz}$$

7 lb 4 oz

21. A child requires a 5 ml dose of medicine each day. How many days would a gallon of this medicine last?

$$1 \text{ gallon} \left( \frac{1 \text{ L}}{0.264 \text{ gal}} \right) \left( \frac{1000 \text{ mL}}{1 \text{ L}} \right) \left( \frac{1 \text{ Day}}{5 \text{ mL}} \right) = 758 \text{ days.}$$

22. The moon is 384,403 km from the earth. Estimate how many quarters laid end to end it would take to reach the moon if a quarter has a diameter of 2.3 cm.

$$384403 \text{ Km} \left( \frac{100,000 \text{ cm}}{1 \text{ Km}} \right) \left( \frac{1 \text{ Quarter}}{2.3 \text{ cm}} \right) = 1.67 \times 10^{10} \text{ or about } 200$$

23. How many years old are you if you have lived 1 billion seconds?

$$1 \times 10^9 \text{ sec} \left( \frac{1 \text{ min}}{60 \text{ sec}} \right) \left( \frac{1 \text{ hr}}{60 \text{ min}} \right) \left( \frac{1 \text{ day}}{24} \right) \left( \frac{1 \text{ yr.}}{365 \text{ d}} \right) = 31.7 \text{ yrs.}$$

24. 1 milliliter of ink can print 50 pages of text. If you had 100 gallons of ink then how many pages could you print?

$$100 \text{ gal} \left( \frac{1 \text{ L}}{0.264 \text{ gal}} \right) \left( \frac{1000 \text{ mL}}{1 \text{ L}} \right) \left( \frac{50 \text{ pt}}{1 \text{ mL}} \right) = 1.9 \times 10^7 \text{ Pages.}$$

25. A clerk can sort 375 sheets per hour. If there are 225 sheets in an inch, how long will it take her to file 125 inches of loose sheets.

$$125 \text{ in} \left( \frac{225 \text{ sh}}{1 \text{ in}} \right) \left( \frac{1 \text{ hr}}{375 \text{ sh}} \right) = 75 \text{ hr.}$$